



Transport
for NSW

Carbon Estimate and Reporting Tool

Version 1, September 2015

Document History

Version	Date of approval	Doc. control no.	Summary of change
#.0		DS#	

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Abbreviations

Abbreviation	Definition
ALCAS	Australian Life Cycle Assessment Society
AusLCI	Australian National Life Cycle Inventory Database
BOQ	Bill of Quantities
BPIC	Building Products Innovation Council
CDR	Critical Design Review – refers to completed (100%) detailed design
CERT	Carbon Estimate and Reporting Tool (the ‘tool’)
EPD	Environmental Product Declaration
FAQs	Frequently Asked Questions
GHGs	Greenhouse Gas Emissions
GWP	Global Warming Potential
HDPE	High-density polyethylene
IPCC	Intergovernmental Panel on Climate Change
I&S	Infrastructure and Services Division
ISCA	Infrastructure Sustainability Council of Australia
IS rating tool	Infrastructure Sustainability rating tool – administered by ISCA.
NGA	National Greenhouse Accounts
NGERS	National Greenhouse and Energy Reporting Scheme
LCA	Lifecycle Assessment
PVC	Polyvinyl chloride
TAGG	Transport Authorities Greenhouse Group
TfNSW	Transport for New South Wales
SDGs	TfNSW Sustainable Design Guidelines
SDR	System Design Review – refers to designs that are at least 20% complete

1. Introduction

Within Transport for New South Wales (TfNSW) the Infrastructure and Services Division (I&S) is responsible for delivering cost-effective and sustainable transport solutions to support the growth of NSW, enhancing its natural and urban environments to provide tangible benefits to customers.

I&S deliver a diverse portfolio of projects ranging in type and size. This includes:

- Infrastructure projects – rail, light rail, commuter car parks, station upgrades, etc.
- Fleet procurement – rolling stock, ferries, etc.
- Power supply upgrades.

In addition to project delivery, I&S delivers environmental, urban design, heritage, sustainability, property, quality management, safety management and commercial support services.

The Carbon Estimate and Reporting Tool (CERT) – ‘the tool’ - has been developed to provide consistency in Greenhouse Gas (GHG) emission assessment and reporting across all I&S projects, and to streamline and simplify the GHG assessment process for I&S, its service providers/contractors and, its stakeholders.

The introduction of the CERT supersedes the previous reporting requirements within the current TfNSW Greenhouse Gas Inventory for Construction Projects.

TfNSW’s Standard Requirements – Environment (TSR-E) will be updated to require completion of the CERT by suppliers, for all projects \geq \$15 million that are also required to complete the Sustainable Design Guidelines.

The tool, an Excel spread sheet, has been structured to enable the user to input data across a range of stages, from System Design Review (SDR) - or equivalent design stage - through to construction (at six-monthly intervals).

The tool is structured across six core tabs:

1. **Introduction** (light orange tab) – provides an overview of the background of the tool.
2. **Navigation** (yellow tab) – enables the user to select their relevant input reporting stage (e.g. SDR, CDR, six-monthly periods during construction).
3. **Project detail** (grey tab) – requires the user to input relevant project information, including any project-specific reduction targets, and includes a section for signing off on data validation and approval prior to submission.
4. **Data input** (orange tab) – comprises the core data entry component of the tool. It includes data entry sections and conversion calculators associated

with usage and mitigation for: Materials; Energy Use; Waste; Land Use/Vegetation Clearance.

5. **Detailed results** (red tab) – there are two red tabs, both of which provide report summary information including useful tables and graphs. The detailed results tab also provides a breakdown of scope 1 and scope 2 emissions for use towards the ISCA Ene-1 credit.
6. **Dashboard** (red tab) – The dashboard provides a performance summary of the relevant project stages in comparison to a base case (an auto-generated business-as-usual scenario) and analyses performance against project GHG reduction targets.

In addition to the above, there are a number of accompanying tabs that provide background detail on the operation of the tool (flow-chart): calculations; formulas; emission factors and data sources; and a series of empty worksheets to enable interim calculations, note taking etc. throughout the completion process.

The CERT emission categories and sources have been determined based on a materiality assessment exercise undertaken by I&S. The tool is specifically designed to capture a project's most significant/material carbon emissions.

1.1. General guidance and information

The following provides a summary of supporting information that will be useful in completing the tool.

Further support can be obtained by contacting cert@transport.nsw.gov.au. TfNSW also welcomes feedback on the tool and encourages its stakeholders to provide comment through use of this email address.

1.1.1. Understanding the terminology

Appendix A provides a summary of commonly used terminology referenced throughout the tool. A full list of abbreviations is included at the front of this guide.

1.1.2. Hints and tips before you start

There are a number of CERT functions that are common, and therefore featured repeatedly, across the various themes of the tool and throughout the lifecycle of project's assessment (i.e. will appear across SDR, CDR and construction stage reporting). These are captured below.

Note: Unless a particular material, energy source, etc. is not being used – data must be entered for **all** emitting categories.

Updating the CERT across relevant project stages

To keep track of the CERT data entries across the respective project stages, it is recommended each version is saved using a unique name. The following naming convention is suggested:

“[tool version] – [project name] – [reporting period] – [submission date]”

For example: “TfNSW CERT v1 – Newcastle Light Rail – CDR – 30 June 2015”.
When reporting against each reporting period, it is recommended the latest version of the file is used and is renamed/updated according to the relevant reporting period.

Data entry cells

As stated, there are six main tabs within the tool that relate to its completion. Within these tabs are the associated data entry cells that enable the tool user to enter relevant information. The data entry tabs are colour coded as follows:

- Orange cells: represent editable data input cells – the tool user is required to enter information directly into these cells. To avoid error, some cells may have limitations to the values that can be entered.
- Orange cells: When a dropdown is available within an orange cell, a value from the dropdown menu must be selected (or the cell should remain empty if not relevant).
- Grey cells: represent non-editable cells. The data in these cells comprise calculations and formulas that are automatically generated by carrying information over from other parts of the tool. I.e. completing the associated emissions calculators will automatically update these cells.
- Blue cells: represent editable evidence cells – the tool user is required to enter evidence/data sources/comments to support the information provided
- Orange underlined text: Hyperlinked text. Clicking on the hyperlinked text will take the tool user to the relevant section of the CERT for data entry.
- Pop up notes: Many data entry cells will show a pop-up note when selected. These notes contain useful information to assist tool users when entering data.

Returning to main entry sheet

Throughout the tool, and in particular on the relevant calculator worksheets, a (purple) ‘go back’ button has been included. This button enables easy navigation between the main data entry sheet and the respective (conversion) calculators. Clicking on the ‘go back’ button will return the tool user to the main data entry sheet once they have finished completing the calculator section.

Evidence/data source/comments

In both the main data entry section and within the respective (conversion) calculators, tool users are required to complete an evidence/data source/comments box to assist with data verification (these cells are blue in colour).

At a minimum, referencing should include the following: “Document title; Version; Issue date; and, page/section reference”.

The nominated I&S Sustainability Officer will perform spot checks of the supporting evidence. A copy of the page/section must be made available on request. The I&S Sustainability Officer may also request confirmation/clarification where a particular data source has not been declared.

The tool user should use their discretion in determining the suitability of evidence. A general rule of thumb is that the evidence identified would clearly link to a) the emission source in question; and b) the volume/quantity stated.

Note: Evidence information must be completed prior to submitting the tool. If the same comment applies to multiple data entries, either copy and paste the response into the relevant cell; or, reference the comments box that is applicable to the section. I.e. “As per comments for Ready Mixed concrete calculator”.

Help function

A series of ‘help’ buttons designed to provide further assistance with completing the tool are included within the various sections of the CERT. Clicking on these will provide a greater level of clarification, context and examples on how to complete the associated section.

Transport Scenarios Calculator

For all materials used across each stage of the project lifecycle, the tool user is required to select the relevant transport scenario from the orange data input cells. Selection is based on a ‘default domestic’, ‘default imported’ or ‘user defined’ scenario based on transport from the point of manufacture. If details regarding the transport-to-site are not (yet) known, the most relevant default scenario for that material should be used (e.g. default domestic/default imported). When the supplier location is (approximately) known, the tool user should select ‘user defined’ and complete and/or update the transport calculator (click on ‘Transport scenario’ to be taken to the transport calculator).

Note: Where the transport scenario has not been entered, the tool will automatically revert to default/base case transport scenarios. The default transport scenarios have been estimated based on rounded (conservative) estimates of typical material supply.

Further information on the emission factors used to determine the transport emissions can be found in the ‘Formulas and Background’ tab of the tool.

Entering data

Only data inputs cells can be altered by tool users. All other parts of the CERT have been locked to prevent unintentional loss of functionality.

Tool users can use the 'Tab' key on their keyboard to move to the next data input cell.

Tip - Workshop the tool: Completing the CERT in a workshop environment with a cross section of the Project team may streamline the process and add value in identifying mitigation measures.

2. Core Tabs

2.1. Navigation Tab

The CERT requires input at the following stages:

- SDR (or equivalent design) stage (~20% design)
- CDR (or equivalent design) stage (100% design)
- Six-monthly during construction (the six-monthly reporting periods run from 1 January – 30 June and from 1 July – 31 December. If a construction period starts on 1 June 2015, the first reporting period will show 1 January 2015 – 30 June 2015.)

The tool is able to cope with projects that cover a construction period of up to five years¹. To reduce the chance of entering data into the wrong period, a 'navigation' tab is included. The navigation tab is where the relevant reporting stage is selected (refer Step 1 in the following instructions). Clicking on the 'Go to Data input' button (Step 2) will take the tool user to the appropriate data entry tab.

To switch to the appropriate period for each reporting cycle (SDR, CDR, six-monthly construction) be sure to return to the navigation tab each time. (Refer Section 1.1.2 for guidance on saving different versions of the tool.)

2.1.1. Selecting the relevant project reporting stage

Step 1: Select reporting period from drop down box.

Step 2: Click on 'Go to data input' button to be taken to the main data entry sheet.

Note: Click on the 'feedback' button for details on how to provide feedback on the tool.

Note: The 'navigation tab' allows the tool user to select the design stage or construction stage needing to be assessed, hiding the other tabs for ease of use.

The construction start and end dates will determine the number of available six-monthly reporting tabs. As a general rule of thumb, construction includes all project work other than minor works such as: fencing, investigative drilling/excavation; building/road dilapidation; minor access roads; minor adjustments to services/utilities; establishing temporary construction sites; and minor clearing.

2.2. Project Details Tab

The 'project details' tab identifies the project being assessed, provides contact details, ensures any reduction targets are articulated, and provides assurance details (i.e. assessment sign off).

¹ Please contact I&S if your project will have a construction period in excess of five years.

Note:

- Information relating to the project's value can be updated at each reporting period as required. This information is collected for internal benchmarking purposes only.
- SDR/CDR – data validation (sign off) must be provided by either a cost planner, design manager or other such equivalent with visibility of the cost planning/tender estimate process.
- Construction – data validation must be provided by the Construction Manager or equivalent (refer Step 9 below).

Step 1: Enter project details (including the project's capital value). Primary and secondary project types can be selected from the drop down box to confirm the scope of your project. For example, the primary project type might be a station, whereas the secondary project type might be a car park.

Step 2: From the drop down box, select the appropriate scale of measurement and then enter the quantity/scale.

E.g. the size of the station might equal 750m² and 200 car parking spaces would be provided.

Step 3: It is important to enter the expected start and completion dates for construction as this information will automatically update the six-monthly reporting tabs within the 'navigation' tab.

Step 4: Enter a project description providing an overview of the scope and remit of the project. This information can usually be extracted from existing planning reports/documentation.

Step 5: Enter any relevant reduction targets that might be specified through the Sustainable Design Guidelines (SDGs); Transport for NSW Standard Requirements (TSR); Infrastructure Sustainability Council of Australia (ISCA); or other requirements as applicable (tick all that apply).

Step 6: Once you have entered the relevant targets, this cell will auto-complete with the total minimum reduction target.

Step 7: Completion of this cell is optional. If you have set an internal (informal) GHG reduction target, you can enter this here to keep track of progress towards this target.

Step 8: Provide details for key contacts responsible for entering the data. You will also need to enter the site address and project location details (where this information differs).

Step 9: To support data accuracy, it is important to ensure data is validated prior to submission. Enter the details of the project team member responsible for validating the CERT submission prior to its issue to I&S

Step 10: This information is for internal I&S use only – do not complete this section.

2.3. Data Input tab

The data input tab can be accessed manually by clicking on the tab within the tool, or automatically by clicking on the ‘Go to data input’ button within the ‘navigation’ tab. The following provides detailed guidance on how to complete this section.

Note: Completing this section of the tool will require referral to the tender estimate, Bill of Quantities (BOQ), or equivalent – i.e. those document/s that were used to price the contractor’s tender - based on material types, volumes etc. In some instances there may be gaps in the data. In these instances assumptions will need to be made in order to complete the data. (For example: assumptions may be needed if there are only high level estimates available - such as km rail or m² of station area – in these instances a cost planner/s should be consulted.).

Tip: As SDR is an early design iteration, it is assumed there will be no, or only minor, changes from the tender estimate through to SDR. The SDR assessment is to be submitted at SDR stage however can be based on the tender BOQ.

2.4. SDR Stage: Data Entry

The following steps provide guidance on completing the tool specific to the SDR project lifecycle stage.

2.4.1. Materials

Within the data input tab the ‘materials’ section requires information to be entered for the following:

- Concrete and reinforcement – ready mixed concrete, pre-cast concrete, reinforcement steel: refer 2.4.1.1.
- Steel – structural steel and post-tensioned steel; galvanised steel; total steel rails (heavy and light).
- Asphalt and Aggregates – asphalt; coarse aggregates; recycled (coarse) aggregates; ballast; sand; manufactured sand.
- Piping – reinforced concrete pipes; steel pipes and tubes; HDPE pipes; PVC pipes, etc.
- Other materials – i.e. glass; aluminium; ceramics, etc.
- Additional materials – any other materials that have not been previously represented and/or captured that are believed to represent ≥5% of the project’s total GHG emissions.

2.4.1.1. Concrete and Reinforcement

The following outlines the necessary steps required to complete the concrete and reinforcement data related to ready mixed concrete; precast concrete and reinforcement steel.

Entering ready mixed concrete quantities

The ready mixed concrete calculator allows input of up to 15 different compressive strengths and mix designs (defined by rate of Portland cement content).

Step 1: Click on hyperlink to access the ready mix concrete calculator.

Step 2: From the drop down boxes – first select the concrete strength grade and relevant unit of quantity (m^3 or tonnes). Now enter the quantity of ready mix concrete and the Portland cement content if known (if unknown leave blank).

Note:

- Portland cement content is used as a proxy for GHG intensity of concrete. Although other components will have some effect, the chosen approach was considered the most practical way for determining the absolute GHG intensity of concrete.
- The base case for Portland cement content is embedded in the calculator; i.e. a benchmark for Portland cement rate in kg/m^3 of concrete. If a lower Portland cement rate is being proposed for a certain application, the subsequent reductions will be credited once the lower kg/m^3 rate is inserted; i.e. this forms a mitigation measure to reduce from the base case.

Portland cement rate can be sourced from supplier mix design sheets.

Entering precast concrete quantities

The precast concrete calculator allows up to 15 different compressive strengths and mix designs (namely Portland cement content) to be entered.

Step 1: Click on hyperlink to access the precast concrete calculator.

Step 2: Select strength grade from drop down menu.

Step 3: Enter quantity and select relevant metric (m^3 or tonnes).

Reminder: Once you have completed the necessary calculator click this button to return to the main tool interface and continue the data entry process.

Note: In contrast to the ready-mixed concrete calculator, the Portland cement content of precast concrete is estimated based on the strength grade. The reason for

this difference in approach is that the exact Portland cement content of precast products could be too difficult to establish for the tool user.

Reinforcement steel incorporated into the precast concrete products should also be entered in this section.

Tip: Consult the product supplier/manufacturer for this information.

Reinforcement steel

The quantity of reinforcement steel used with ready mixed concrete can be entered directly into the tool. Reinforcement steel embedded in precast concrete should be entered in the precast concrete calculator section. Post-tensioning steel information should be entered in the Steel section.²

Step 1: Enter the quantity of reinforcement steel directly into the tool

Tip: Reinforcement steel quantity would typically be sourced from the Bill of Quantities.

Entering transport scenarios for ready-mixed, precast concrete and reinforcement steel

Once you have finished entering data into the main data entry sheet and the respective calculators, you will need to enter data on materials transport ('transport scenarios').

User defined transport scenarios are intended to reward local procurement initiatives. The default transport benchmarks are listed next to the user defined section for ease of comparison. The source of assumptions for the default transport scenarios are provided in the Formulas and background tab within the tool.

Step 1: From the drop down list, select the option to define the transport scenario 'user defined' or use the default scenario 'default domestic'. When you are ready, to enter user defined transport information, click on 'Transport scenario'.

Prompt: The correct transport scenario must be selected before proceeding – either default domestic, default imported (where available) or user defined (see Step 1 above). If an appropriate option is not selected, the tool will revert to a default. If you have selected the user defined option, clicking on 'Transport scenario' will take you to the following transport calculator where transport data should be entered.

Step 2: Insert the distance travelled by the relevant type of vehicle for each material.

² The reasons for splitting up these three types of reinforcement steel are due to differences in emission factors as well as differences in how the information is typically available to the tool user.

Note: If travel distances are not entered, the tool will automatically default to the base case scenarios.

Steel

There are three components that comprise the entries for 'Steel' within the tool. Of these, two ('structural steel and post-tensioned steel' and 'galvanised steel') enable quantities to be directly entered into the relevant data input cells. Only data entry regarding 'total steel rails (heavy & light)' requires use of the relevant calculator.

Step 1: Enter materials quantities directly into the cells for the first two components. Be sure to complete the transport scenarios calculator and provide the relevant compliance evidence.

Step 2: Click on the hyperlink to access the rail calculator.

Step 3: Enter track type quantities.

Tip: Note that the length is expressed in track metres. One track metre consists of two metres of rail. The mass of the rail is expressed in kg/m of single rail (not track metres).

Step 4: If applicable, select the rail type from the drop down menu, then enter rail mass (kg/m) and quantity (length of track in m)

Tip: Use the empty worksheet tab 'Sheet for notes (Materials)' to record quantities of structural steel and post-tensioning steel before aggregating them into the data input cell.

2.4.1.2. Asphalt and Aggregates

This section requires the tool user to enter details for asphalt and aggregates usage. Asphalt information can be entered using the relevant calculator (see Asphalt Step 1 below), whereas aggregates information should be entered directly into the main data entry sheet.

Asphalt

The asphalt calculator allows the tool user to input details on the type of asphalt being used and the unit of measurement (tonnes/m³) from the drop down list.

Step 1: Click on hyperlink to access Asphalt calculator.

Step 2: Select the type of asphalt to be used from the drop down list. Enter the appropriate quantity and unit of measurement (m³/tonnes).

Aggregates

Step 1: Select the unit of measurement from the drop down menu and enter the quantity of aggregates directly into the tool.

Step 2: Be sure to update the transport scenarios calculator to account for the travel associated with asphalt and aggregates.

2.4.1.3. Piping

There are a total of four calculators to assist the completion of piping information. The tool user will need to complete these in order to populate the grey (auto-complete) cells on the main data entry sheet. Once information on quantity has been entered, the appropriate transport scenarios will need to be completed to finish this section.

Step 1: Click on relevant hyperlink to access piping calculators.

Note: This section of the tool provides calculators for each of the listed piping types. To enter the relevant type of piping just scroll down the page or click on the relevant hyperlink.

Step 2: Calculate the quantity of each of the four identified piping categories by completing the relevant calculators. Information regarding nominal pipe lengths and mass can be found in the supplier's product documentation.

2.4.1.4. Other materials

Step 1: Enter the quantities of aluminium and ceramics used directly into the corresponding cells. For glass and electrical cables click on the hyperlink to access the relevant calculators.

Note: This section of the tool provides calculators for each of the listed electric cabling types: copper conductors; aluminium conductors; other conductors. To enter the relevant types of cabling just scroll down the page to access these.

Step 2: Update the transport scenarios for other materials.

Step 3: Enter details on the type of glass/application; glass thickness (refer supplier's product documentation); and quantity (m²) used on the project.

Step 4: Calculate the quantity of each of the three identified cabling categories by completing the relevant calculators.

Information regarding conductor area and mass can be found in the supplier's product documentation.

2.4.1.5. Additional materials

For any further materials that may not already be captured, there is an additional area for inclusion. As these will be different across various projects, emission factors

for these will need to be sourced and provided by the tool user when completing the section.

Tool users only need to enter data into this section if the additional materials have a significant impact on the project GHG emissions. Small amounts of materials that are not covered elsewhere in CERT do not have to be included.

This section is intended to accommodate materials that were not identified and included in the CERT as a result of I&S's materiality assessment and innovative materials (e.g. geopolymers concrete) not typically used on infrastructure projects but could reduce emissions.

Note: Evidence of emission factors should be provided by suppliers, e.g. through registered Environmental Product Declarations (EPDs), plant or equipment product specifications, or equivalent.

Step 1: Identify additional materials including quantity, unit and emission factor.

Step 2: Calculate transport associated emissions.

2.4.2. Materials mitigation measures

The 'materials mitigation' section seeks to capture and reward opportunities to mitigate the emissions associated with materials. Mitigation measures might include alternative material solutions; optimising design (value engineering), etc.

Value engineering has been disabled at the SDR stage, as it is deemed too early in the design stage to claim design changes.

Step 1: Define the materials mitigation activity and enter the quantity of materials contributing to the reduction and specify the associated unit of measurement from the drop down box.

Step 2: Identify the emission reduction factor.

Note: The change in material quantities calculator is not available for the SDR tab. This is because the project team has not progressed the design and therefore cannot realistically identify what design changes/optimisation will/have taken place.

Tip: The mitigation achieved through 'Reduction in material transport' is calculated automatically based on the user defined scenarios that have been entered.

2.4.3. Energy use

The energy use category comprises of a number of calculators associated with:

- Electricity use – total used on-site.
- Diesel consumption for site vehicles.

- Diesel consumption for stationary plant and equipment.
- Diesel consumption for mobile plant and equipment.
- Total usage of other fuels that have been consumed on-site in site vehicles, stationary and mobile plant equipment.

2.4.3.1. Energy - electricity use on-site

The energy (electricity) calculator provides the tool user with two options for data entry.

Note: It is important to avoid double counting by using one of the options. However, use of both options may be appropriate where, for example, total electricity use specifically excludes certain plant/equipment and this is known to the tool user.

Step 1: Click on hyperlink to access electricity use, on-site total calculator.

Step 2: Enter electricity consumption data into either Option 1 (per site/grand total) or Option 2 (per type of equipment used).

2.4.3.2. Diesel (fuel) consumption for site vehicles

This section provides the tool user with three options for completing the relevant calculator. Options are based on the level of data available.

Step 1: Click on hyperlink to access diesel consumption for site vehicles calculator

Step 2: The energy calculator for fuel allows you to enter data using a range of options. (Fuel types can be selected from the drop down list)

- Option 1: input kL estimates for each fuel type to be used.
- Option 2: estimate emissions based on construction months and size of project.
- Option 3: estimate emissions based on vehicles types and km travelled.

Note: Contractor site vehicles are not included in the scope of the CERT.

2.4.4. Diesel (fuel) consumption for stationary plant

Tool users are provided with two options for uploading relevant data.

Step 1: Click on hyperlink to access diesel consumption for stationary plant calculator.

Step 2: Complete Option 1 (total fuel consumption estimates) or Option 2 (equipment and plant hours) based on available data.

2.4.4.1. Diesel consumption from mobile plant

Tool users are able to enter diesel consumption from mobile plant through two options:

- Option 1: based on total fuel consumption estimates.
- Option 2: based on equipment and plant hours.

It also provides the tool user the option to include any additional equipment not previously listed.

Note: It is important to avoid double counting by using one of the options within each energy (fuel) emission source. However, multiple options may be appropriate where for example total fuel use is known for the principal contractor's plant and equipment and dry hire; but for wet hire, assumptions need to be made based on specific equipment types.

Step 1: Click on hyperlink to access diesel consumption for mobile plant calculator.

Step 2: Enter data based on total fuel consumption estimates (Option 1) or equipment and plant hours (Option 2).

Step 3: If there is any additional equipment that has not yet been captured, use this table to enter relevant information.

2.4.4.2. Total of other fuels consumed on-site in site vehicles, stationary and mobile plant

Within the energy-use calculators, tool users are asked to specify the 'fuel type' from a drop down box listing diesel, petrol, LPG and Ethanol blend (10%) as options. The cell containing 'total of other fuels consumed on-site in site vehicles, stationary, and mobile plant' automatically completes to include all petrol, LPG and Ethanol blend (10%) consumed on-site once the relevant calculators have been updated.

Note: This information automatically generates based on the entries related to petrol, LPG and Ethanol blend (10%) consumption entered for the other calculators.

2.4.5. Energy use - mitigation measures

This section enables energy mitigation measures to be registered for the project. The tool identifies a series of pre-determined energy mitigation areas (e.g. electricity from renewable sources, reduction in electricity use, etc.) and also provides the opportunity to capture any other categories that may not be covered by those listed.

It allows the tool user to input relevant information based on energy content (kWh, GJ), fuel use (kL) or percentage reduction.

Once the unit of measurement has been selected from the drop down box, information can be entered directly into the relevant cells.

Note: Remember to reference relevant policies and evidence to support the mitigation measures listed. Examples might include a copy of an idling policy; renewable energy generated onsite; specifications outlining the use of efficient plant and equipment etc.

Step 1: Input relevant energy mitigation measures for all those initiatives that apply.

Step 2: Input additional mitigation measures as appropriate.

Tip: The emission reduction factor shows as zero until a unit is selected. When the unit is based on a percentage reduction, the emission reduction factor will be determined based on the relevant amount of energy consumed and represents 1% of emissions associated with total energy use for the category (e.g. electricity, mobile plant, etc.).

2.4.6. Waste generated

This section of the tool assesses the amount of waste generated by the project and sent to landfill or recycling centres.

In order to account for emissions from degradation in landfill, the tool user is required to distinguish inert waste (such as concrete, metals, glass, sand, spoil etc); timber and vegetation waste; and, mixed waste (i.e. a mix of concrete, timber, bricks etc). A transport distance of 50 km to the landfill site is automatically assumed.

Note: Transport of waste to landfill automatically generates based on the below inputs.

Step 1: Enter waste details directly into tool including relevant quantities and units – tonnes or m³.

2.4.7. Waste mitigation measures

The measurement of waste mitigation measures aims to capture details on the amount of waste being diverted from landfill. Waste transport to an off-site recycling centre is included. It assumes a transport distance of 22 km to the recycling centre.

Additionally, the tool seeks to capture any waste mitigation measures that might have been adopted onsite i.e. materials that have been constructed off site or the selection of prefabricated components etc.

Step 1: Enter quantities of waste sent off site for recycling and the amounts reused on site. The grey cell associated with waste transport will automatically generate based on the quantities entered for waste sent off-site.

Step 2: Enter any additional waste mitigation measures, then input the quantity and from the drop-down box select the appropriate unit of measurement – kg; tonnes; m³;

tkm. Following this, identify and enter the emission factor relevant to the mitigation measure identified.

2.4.8. Land use / vegetation clearing

The land use category seeks to identify the emissions associated with vegetation clearing. A specific calculator has been included to assist with identifying the type of vegetation being cleared.

Based on the maps provided in [Attachment A of the TAGG 2013 Workbook](#) the tool user is required to identify the vegetation type and the 'Maxbio' class for the location within the calculator (refer Appendix B).

Step 1: Click on the 'total area of vegetation cleared' hyperlink – the cells in this section auto-complete once data has been entered into the vegetation clearing/land use calculator.

Step 2: Select the vegetation class from the drop down box; and enter the appropriate Maxbio class (refer Appendix C).

Step 3: Enter the area cleared in hectares; the tool will then automatically calculate the emission factors and total emissions.

2.4.9. Revegetation – mitigation

The tool does not enable revegetation measures associated with carbon sequestration to be captured. This aligns with the approach outlined in the TAGG 2013 Workbook which considers offsets from revegetation as non-viable due to the implementation costs. Mitigation from vegetation offsets provided within the project boundaries are not currently accounted for in the tool.

Note: this section does not require any data input.

2.4.10. Completion of SDR Stage Data Entry

Once data for land use/vegetation clearing has been entered and appropriate evidence documentation completed across all categories, CERT reporting for this stage of the project is complete.

Prior to submitting the completed SDR CERT to I&S for review, ensure the data is checked and verified/assured as per the guidance outlined in Section 2.2.

Reminder: To keep track of the CERT data entries across the respective project stages, it is recommended that each version is saved using a unique name.

The following naming convention is suggested:

“[tool version] – [project name] – [reporting period] – [submission date]”.

For example: “TfNSW CERT v1 – Newcastle Light Rail – CDR – 30 June 2015”. When reporting for each reporting period, it is recommended the latest version of the file is used and is renamed/updated according to the relevant reporting period.

2.5. CDR Stage: Data Entry

For the most part, the steps required to complete the tool during CDR stage are the same as those required with completion during SDR stage.

The following section notes specific differences between SDR and CDR reporting stages and provides clarity on data and tasks required specific to the CDR stage of the CERT.

2.5.1. Data Input

A key functionality at the CDR reporting stage is the ability to carry across source data from SDR. This functionality enables the tool user to input data by either copying it across from the SDR data page, or updating based on new CDR data (e.g. revised Cost Plan or equivalent). In most instances (depending on variables such as the size of the project), a new BOQ would be developed or the tender phase BOQ refined as part of updating the Cost Plan to reflect final design. The project cost planners or procurement teams should have access to this revised Cost Plan/BOQ information.

Note: clicking on the grey ‘SDR to CDR’ button, automatically updates the CDR data entry sheet with all information entered during the project’s SDR stage

Tip: Copying data over from SDR to CDR will overwrite any data the user already entered on the CDR tab. Therefore it is recommended to copy data across first before changes are made to the CDR tab.

The extent to which the design may change from SDR to CDR is dependent on the project. Typically there would be substantive design changes driven by activities associated with scope variation or design optimisation (such as value engineering) exercises.

The CERT manages this issue by enabling different options for data input from SDR to CDR stage.

The tool user may either:

1. Copy SDR input data to the CDR tab and leave unchanged.
2. Copy SDR input data to the CDR tab and update based on final design and associated BOQ.
3. Start afresh using a blank CDR worksheet to input new CDR data based on final design and associated BOQ.

2.5.1.1. Materials mitigation measures

The main area of difference between the SDR and CDR stage reporting relates to materials mitigation.

During CDR stage the functionality to include design optimisation options is enabled and the tool user can opt to include user defined mitigation measures (such as recycled material) and/or can use the change in material quantities calculator.

The following example is based on using 500 tonnes of TonerPave asphalt to replace 500 tonnes of asphalt. This is captured in both the mitigation measures section of the table and the value engineering table.

The first step would be to enter the relevant material and define the emission factor for the material (in this case TonerPave). Following this you would need to enter those materials to be replaced/engineered out – in this case 500 tonnes of Asphalt.

Change in material quantities – design optimisation

Design optimisation can be captured in the value engineering section under 'Materials Related Mitigation Measures'. This is only applicable to CDR as at SDR stage design is not sufficiently progressed to have implemented design optimisation opportunities.

Note: Design optimisation must be accompanied by evidence (e.g. meeting minutes) and must be an active decision to improve design, namely reduce or optimise material consumption. A change (lessening) of design scope (e.g. removal of bridge) is a scope change and cannot be considered a mitigation measure.

Option 1: Copy SDR input data to the CDR tab and leave unchanged.

The 'change in material quantities' calculator can be used to demonstrate improvements from early (SDR) design to CDR. It is important to note both material reductions and additions must be accounted for. This is enabled through the allocation of a +ve or -ve in the calculator. While some design optimisation may constitute a simple reduction in materials, in many instances a reduction in one material may require an increase in another. Such increases need to be included to ensure a balanced representation of design changes.

Example: In the SDR phase 400 tonnes of 40 MPa concrete was used for a car park floor base ('Ready mixed concrete (I)' in *Ready mixed concrete* calculator). Through design optimisation, 350 tonnes of concrete will be used based on CDR design. By selecting the appropriate material and inserting -50 tonnes into the calculator, a reduction from the base case will be enabled.

Step 1: Insert reduction in material. E.g. ready mixed concrete reduction of 50 tonnes.

Step 2: The tool auto-generates the amount of CO₂ saved as a positive figure (e.g. 8 tCO₂e). This figure is then added to the total forecast CDR emissions to account for mitigation.

Note: As there are only 12 rows available in the Change in material quantities calculator, only significant design optimisation/change exercises should be captured.

Option 2: Copy SDR input data to the CDR tab and update based on final design and associated BOQ.

By updating the SDR input data based on new BOQ information, any efficiencies gained from SDR to CDR will be lost. This is because there is NO automatic linking of data in SDR to CDR.

Therefore the only option to demonstrate improvements i.e. material reductions and efficiencies from SDR to CDR is to use the Change in material quantities calculator.

A limitation of inputting data using this method is that it will create an artificially smaller GHG footprint as it is subtracting from the CDR design data (which is the final design; not a base case). This does not pose a significant issue because the purpose of this exercise is to encourage mitigation and measure implementation, and at the design stage the calculation always provides an estimated forecast of construction emissions. What is important is the approximate per cent (%) reduction achieved so as to support six-monthly reporting on actual emissions (see Section 2.6).

Option 3: Start blank, inputting new CDR data based on final design and associated BOQ.

The tool user may choose to start the CDR data input sheet blank (e.g. choose not to copy information across from SDR stage). If this option is selected then the same approach as identified for Option 2 above will apply.

2.6. Six Monthly Construction Stages: Data Entry

The data entry processes for entering six-monthly construction stage reporting are the same as those entered at the SDR stage. The key difference between reporting at construction phase as opposed to design phase (SDR and CDR) is that the data entered will be actual data i.e. based on invoices; meter readings etc. In instances where invoices are late, the tool user is advised to retain this information and simply add it to the reporting data for the next six-months. At project completion, all materials used in the project should have been accounted for.

The reporting periods are defined as from 1 January – 30 June, and 1 July – 31 December across the full program of construction.

2.7. Detailed Results tab

The 'detailed results tab' provides a range of graphs that are informed by the data entered across the project lifecycle. The detailed results tab provides useful summary information through a number of graphs that help track progress. Notably, this section of the tool also provides a breakdown of scope 1 and scope 2 emissions for use towards the ISCA Ene-1 credit (refer Appendix D). Key graphs within this section include:

- Breakdown of emissions per emitting category for each stage of the project.

The graph can also be generated to show emissions for all stages of the project. From the drop down box available, the tool user will need to select the relevant reporting period to be represented.

- Breakdown of emissions by scope for each stage of the project.

The graph can also be generated to show the breakdown of scopes across all stages of the project. From the drop down box available, the tool user will need to select the relevant reporting period to be represented – the graph can also be generated to show the breakdown of scopes across all project stages.

- Six-monthly absolute or cumulative project emissions.

The tool user will first need to select the option to display cumulative or absolute emissions from the drop down box. Then you will need to select the data to be shown by checking the relevant tick boxes.

- Reductions achieved across key emitting categories (materials, energy, land use, waste).

The tool user will need to select which reporting period is to be displayed from the drop down box (includes an option to display all periods).

2.8. Dashboard tab

The 'dashboard tab' provides an outline of the forecast and actual emissions against the base-case in order to present the total percentage reduction in project emissions. This information is presented in a table and 'speedometer' graphic – both of which are auto-generated based on the information added at the project details stage and across all of the project's reporting stages.

The table appearing at the top of the worksheet summarises forecast and actual emissions across the relevant project stages to highlight the level of emissions reduction achieved relative to the base case.

The speedometer provides a graphic display on how the project has tracked against the emissions reduction targets identified for the project

Note: The information button on this page provides further information about the data represented in the table and speedometer.

The dashboard also provides the user with the option to generate graphs based on actual performance against the estimates entered at design stages of the project. You can do this by selecting the relevant design period to be displayed – SDR or CDR.

Emissions against the base case for the various project periods can also be displayed. To do this select the relevant project stage to be shown from the drop-down box.

To assist with the broader benchmarking and comparison across I&S projects, an auto-generated KPI response is included in the dashboard that presents the total amount of GHG emissions per million dollars (tCO₂e/\$m).

The final feature of the dashboard is to present a summary of emissions reduction equivalent to a number of car trips; number of flights; average Australian per capita and NSW households. This has been developed to assist with communicating emission reductions to third parties. It provides an idea of the size of emissions reduction compared to the base case for each stage of the project and shows equivalences for the relevant stages of the project, which can be selected from the relevant drop down box.

Appendix A: CERT Glossary

Table 1 CERT Glossary

Term	Definition
<p>Actual Emissions</p>	<p>Relates to the project’s construction stage emissions. As the name suggests, these relate to the actual emissions being produced during project construction. Data will largely be informed and confirmed by invoices.</p>
<p>Base Case</p>	<p>The tool automatically calculates a project base case for each associated stage of the tool (SDR, CDR or actual). It is designed to provide an understanding of a business-as-usual approach that does not factor in mitigation measures.</p> <p>Emissions reduction across the construction life of the project is measured against the respective base-case NOT against each respective stage. For example, CDR emissions reductions are based on the auto-generated CDR base case – they are not based on emissions reduced through design refinements since SDR.</p> <p>The base case is calculated by applying default emission factors for relevant materials (e.g. concrete, asphalt etc.) to the quantities of materials entered by the tool user. It also takes into account a default transport scenario for the associated materials.</p> <p>Any value engineering options that lead to changes in the materials quantities (typically a reduction in materials or switch from one material to another) should be entered in the ‘Materials – mitigation measures’ section. (This is possible from CDR stage onwards.)</p> <p>Note: It is possible to end up with a design that has higher emissions than the base case. This would be the case if for example the cement content in the specified concrete is higher than business as usual, or if transport distances are much larger than usual.</p> <p>The base case relates to all data (excluding mitigation measures) associated with materials, energy, waste and</p>

Term	Definition
	land use.
Carbon dioxide equivalent (CO₂e)	<p>A standard measure that takes account of the different global warming potentials (GWPs) of greenhouse gases and expresses the cumulative effect in a common, universal unit of measurement.</p> <p>CERT uses GWPs taken from the IPCC's Second Assessment Report (SAR), applying a 100 year time horizon. This is consistent with NGA and NGERS reporting.</p>
Critical Design Review (CDR)	CDR represents design completion. CDR tool entries would be based on the project's completed detailed design (i.e. 100%).
Emission Factors	<p>Emission factors for calculating emissions are generally expressed in the form of a quantity of GHG emitted per unit of activity – e.g. energy (kg CO₂e /GJ), fuel (kg CO₂e/L diesel) or material (kg CO₂e/kg steel). Emission factors are used to calculate GHG emissions by multiplying the factor (e.g. kg CO₂e/GJ energy in petrol) with activity data (e.g. kilolitres x energy density of petrol used).</p> <p>The emission factors used in CERT cover scope 1, 2 and 3 emissions.</p>
Forecast Emissions	Forecast emissions relate to those emissions estimated during SDR and CDR reporting stages. They are based on design estimates rather than actual emissions that are generated through the construction phase.
Mitigation	Represents measures and initiatives to reduce the GHG emissions associated with materials, energy and waste in the project.
System Design Review (SDR)	SDR commonly represents approximately 20% design completion. The CERT supports completion of a preliminary carbon estimate based on early design

Term	Definition
	details.
Tool user	<p>Throughout the steps outlined in the guide, reference is made to the 'tool user'. This is the person or people whose responsibility it is to complete the CERT for their respective project.</p> <p>Note: It is at the discretion of the contractor/consultant to nominate the individual/s responsible for completing the CERT and submitting the accompanying reports. However at both SDR and CDR or equivalent stages, signoff must be provided by a cost planner, design manager or equivalent representative with visibility of the cost planning/tender estimate process.</p>

Appendix B: Maxbio Classification Maps – NSW

TAGG 2013 Workbook, Attachment A - Maximum Potential Biomass Classes:
<http://www.rms.nsw.gov.au/documents/about/environment/greenhouse-gas-assessment-workbook-road-projects.pdf>

Appendix C: Supporting information

A selection of supporting information is provided to address a number of CERT requirements that might need further clarification.

Mitigation evidence requirements

While it is important to include evidence requirements as identified in Section 1.1.2, it is important to note that mitigation evidence in particular, will be reviewed in greater detail i.e. with more numerous spot checks as per above method. It is critical that all references to mitigation evidence, as a minimum follow the following referencing protocol:

- document title;
- document version;
- issue date; and,
- page/section reference.

Table 2 below provides examples of acceptable mitigation evidence for the different emission categories and sources.

Table 2 Example of acceptable mitigation evidence

Source	Example evidence
Materials	
User defined Portland cement content for ready mix concrete	<ul style="list-style-type: none"> • Concrete mix design sheet
Recycled/alternative material	<ul style="list-style-type: none"> • Page of BOQ, or • Supplier invoice, and • Emission factor source
Change in material quantities (value engineering)	<ul style="list-style-type: none"> • Meeting minutes from value engineering workshop
Energy Use	
Green Power	<ul style="list-style-type: none"> • Copy of contract with electricity supplier
Reduction in diesel consumption for mobile plant (e.g. via idling procedure)	<ul style="list-style-type: none"> • Copy of idling procedure, and • Audit results from onsite idling checks
Waste	
Waste reused on site (e.g. reuse ballast for road base)	<ul style="list-style-type: none"> • Photos of material in end use, and • Email from Construction Manager estimating volumes of material reused

Submission requirements

The following provides general guidance related to report submission requirements. It is noted that these may change for a particular project and any project specific requirements as outlined by the TfNSW Project Sustainability Officer should be followed.

Generally, completed CERT reports should be sent to the TfNSW Project Sustainability Officer in line with the following requirements:

- Submit the final version of the CERT to the nominated TfNSW Sustainability Officer at:
 - SDR design stage (or equivalent)
 - CDR design stage (or equivalent)
 - Six-monthly (from official start of construction)
- Once the tool has been completed for each of the above stages, submit a short memo (template provided in Appendix E) outlining the key results

Important: TfNSW will only accept CERT submissions that are:

- **Complete** – quantities have been completed for all emitting categories and sources (unless the source is not applicable to the project)
- **Supported by documented evidence** – a 90% evidence inclusion rate is required for general data input. A 100% evidence inclusion rate is required for evidence of mitigation measures

Note: at SDR and CDR stage, some mitigation measures may be likely but not 'locked in'. However some evidence of the source of the proposed measure is required e.g. email communication to a supplier of an alternate material.

If these minimum criteria are not met, the Sustainability Officer may return the report for revision by the tool user.

Constraints and common questions

While every effort has been made to facilitate the creation of a flexible and user-friendly tool interface we acknowledge the CERT will have some limitations. Feedback is both encouraged and welcomed to help refine and improve future versions on the tool. Comments can be provided at cert@transport.nsw.gov.au

The following section provides an overview of some of the known constraints of the tool to help tool users understand current limitations.

A summary of frequently asked questions has also been included – these have been generated through the engagement process that has underpinned the tool's development.

Constraints

- To simplify the tool’s data entry process, the option has been included to either input transport scenarios specifically, or use default, business-as-usual transport scenarios. The transport of materials is and will remain a difficult/contentious issue particularly with regard to referencing a base case. For example, some of the emission factors are not state specific due to information not being available which means they assume a worse case or better case baseline than what could be realistically expected for NSW. Further it is impractical to record all raw materials from the beginning of the project lifecycle (e.g. iron ore and cokes used for steel production).
- Transport is not a major contributor to GHG emissions for most projects (less than 10% on average based on the materiality assessment undertaken by I&S). The decisions made regarding transport distances, modes, return loads, etc. will have a limited effect on the overall carbon footprint of a project.
- In order to develop the base case some assumptions have been required due to a lack of existing data and/or reference material. Where assumptions have been made this information is documented, refer ‘*formulas and background tab*’.
- In line with the TAGG 2013 Workbook vegetation offsets are not included as part of land clearing mitigation. It is acknowledged that this could present an issue for greenfield projects as land clearing can produce large emissions profile. It is anticipated this will be reconsidered when the second version of the tool is planned.
- The CERT tool is a simplified, high level GHG reporting tool. It is not designed to substitute detailed Life Cycle Analysis (LCA) models – future versions of the tool make seek to reconcile the inclusion of LCA.

Frequently Asked Questions

The following outlines a number of frequently asked questions (FAQ) that have been posed during the tool’s development and pilot stages. They are designed to provide further context and guidance to support completion of the tool.

Table 3 CERT frequently asked questions

Question	Response
Interface with design	
My project has more than one design package, with design review/submission dates differing in terms of program. How does the CERT facilitate this?	Please use more than one copy of the CERT for each major design package. TfNSW will accept multiple submission of the CERT for large projects with complex design packages. However the memo (refer Appendix E) should collate the results to represent one project.

<p>Can't I just "over design" at SDR to look better at CDR and construction stage reporting?</p>	<p>No. The aim of the tool is not to compare the various stages against each other, but to compare them against the auto-generated base case. Conservative/over designing at SDR stage to try and achieve efficiencies later in the project will serve no benefit as all emissions reductions are charted against the respective base case.</p>
<p>Why haven't operational emissions been included in the tool?</p>	<p>Development of the CERT has borne out of the GHG Inventory Guide for Construction Project – this approach has not included operational emissions and as such at this point in time operational emissions are not included.</p>
<p>What if the quantification is way off, quantification can be way out from reality? Is there a margin for error? Contingency?</p>	<p>There is always a risk that quantities are off. Until now, this was difficult to spot because of the variation in reporting formats, scope, etc. With CERT, TfNSW can compare materials use and greenhouse gas emissions to other (similar) projects.</p>
<p>I can only change the Portland cement quantity to achieve reductions for ready mix and precast concrete. What about recycled aggregates etc?</p>	<p>Recycled aggregates only have minor impacts on the carbon footprint of concrete. Therefore it was determined that there is no need to distinguish these for the purposes of the CERT</p>
<p>So if I copy across SDR data to CDR and update the changes to CDR manually efficiencies from SDR to CDR will be lost?</p>	<p>Yes, while improvements in managing design change and optimisation in subsequent CERT versions may be considered, currently if you choose this data input option you will need to use the change in material quantities calculator to demonstrate efficiencies and reductions.</p>
<p>Base case generation</p>	

<p>How is the base case generated?</p>	<p>The base case is generated via:</p> <ul style="list-style-type: none"> i) Business as usual assumptions related to transport scenarios and concrete Portland cement content, and ii) The mitigation measures identified by the tool user <p>The base case is the estimated forecast or actual emissions for the project without any user defined i) transport/concrete estimates and ii) mitigation measures. (Refer Appendix A)</p>
<p>My mitigation measure is not provided for in the CERT. How can I include it?</p>	<p>Each category (except land use change) allows for user defined mitigation measures. The tool user must source the emission factor.</p>
<p>Compliance with other standards and requirements</p>	
<p>How does the CERT relate to the National Greenhouse and Energy Reporting Scheme (NGERS)?</p>	<p>The CERT scope of emissions sources differs from that of NGERS e.g. it allows estimation of scope 3 emissions. However, the energy use category has been developed to allow data gathered for NGERS reporting purposes to be easily transferred for CERT reporting</p>
<p>Does the CERT align with commonly accepted standards for GHG assessment??</p>	<p>There are a number of Standards (e.g. WRI GHG Protocol, ISO14040, ISO14067, PAS2050) that could be applied, and all are slightly different. Although the calculator uses key carbon accounting principles, it is also a simplified reporting tool with limited scope. There has been no formal assessment of consistency with different Standards as yet.</p>
<p>Why aren't Scope 3 emissions captured more fully?</p>	<p>The tool was informed by a materiality assessment that sought to identify significant emissions sources for projects. Therefore only those emissions that are of material impact have been included.</p>

<p>Will completing the CERT automatically meet the associated requirements under the ISCA tool?</p>	<p>No. I&S has worked in close collaboration with ISCA to align the CERT with the Infrastructure Sustainability rating tool where possible, but the use of the CERT does not automatically comply with the IS requirements for energy and materials. Notably, completing the CERT will meet ISCA's reporting requirements for Ene-1 emissions associated with design and construction but not for operation. As noted previously, operation is not covered by CERT and will need to be calculated separately to meet ISCA's requirements.</p>
<p>Is the ISCA base-case and CERT base case the same?</p>	<p>The CERT base-case may provide a basis for an ISCA base case once combined with suitable operation emissions and subject to verification through ISCA.</p>
<p>Emissions factors change fairly regularly – how frequently will the tool be updated?</p>	<p>I&S acknowledges that emission factors for both electricity and materials are updated frequently. It is anticipated that emission factors will be reviewed on an annual basis and I&S will work closely with key stakeholders to ensure this is an efficient process. It should be noted that projects will not be required to change to future versions of the CERT once reporting has commenced. For example, if a project commences reporting at SDR using CERT v.1 it should use CERT v.1 for all subsequent stages of project reporting.</p>

Appendix D: CERT Overview and Context

Introduction

TfNSW is committed to working in partnership to deliver innovative and sustainable transport networks that make NSW a great place to live and work. As an organisation, TfNSW has a demonstrated commitment to sustainability and aims to be a world class authority delivering safe, reliable and integrated transport across the State.

As part of its broader sustainability commitment, greenhouse gas (GHG) or carbon emissions, are viewed as a key sustainability issue for TfNSW and have been identified as an appropriate metric for measuring sustainability performance. The measurement of GHG emissions are central themes in the:

- **TfNSW Environment and Sustainability Framework:** the Department's corporate sustainability framework includes key themes around energy and resource management that seek to reduce consumption and emissions.
- **TfNSW Transport Projects' Sustainability Framework:** Infrastructure and Services Division (I&S) confirms a GHG emissions reduction target of 15% (from a 2010 baseline) by 2020. It also identifies a need to reduce the absolute quantity of Portland cement by at least 30% as an average across all concrete mixes subject to meeting strength and durability requirements).
- **TfNSW Sustainable Design Guidelines:** The Sustainable Design Guidelines (SDGs) support the preparation of a carbon footprint assessment for all projects, and, reducing the use of Portland cement quantity.

It is important to note, the introduction of the CERT does not place an additional reporting requirement on I&S's stakeholders. Rather, it seeks to streamline and simplify the current process associated with the assessment of project GHG emissions from design through to construction. The introduction of the CERT will supersede the requirements within the current TfNSW *Greenhouse Gas Inventory for Construction Projects*, and in future TfNSW's Standard Requirements – Environment (TSR-E) will be updated to require completion of the CERT for all projects ≥ \$15million.

Purpose and objectives

Development of the CERT serves two main purposes for I&S:

- To provide consistency in GHG assessment and reporting (i.e. to ensure all projects measure and report emissions in the same way).
- To streamline and simplify the GHG reporting and assessment process for both I&S and its supply chain.

Its main objectives are:

- To estimate a project's construction phase GHG emissions profile from detailed (SDR) design stage through to construction completion.
- To encourage the investigation and implementation of GHG reduction (mitigation) measures.

Ultimately, it is anticipated the CERT will ease the burden of reporting by making the data input process easier and more straightforward.

Developing the CERT

At its core, the GHG emission sources included in the CERT have been informed by a materiality review undertaken by I&S's Sustainability and System's team. The aim of the review was to identify the material (i.e. significant and/or important) emissions sources across a cross-section of typical I&S projects.

The outcomes from this materiality assessment have directly informed development of the CERT. The tool comprises a number of predefined GHG emitting activities/sources.

A comprehensive engagement process has further informed development of the CERT. Key stakeholders that were engaged throughout the process include (but are not restricted to):

- Sydney Trains
- Roads and Maritime Services (RMS)
- Transport Projects Delivery Office (I&S)
- Various tier 1 and 2 contractors
- Wickham Transport Interchange (WTI) project team
- Infrastructure Sustainability Council of Australia (ISCA)

A key component of developing the tool was testing and piloting the draft tool on the Wickham Transport Interchange project to gain practical insight into its useability and functionality. I&S has also worked closely with ISCA to seek alignment (where possible) with relevant categories within the Infrastructure Sustainability (IS) rating tool e.g. Energy-1 (Ene-1) and Materials-1 (Mat-1). Further details on the tool's engagement and development process can be found in Appendix D.

ISCA and CERT

Reflecting the I&S requirement for all projects \geq \$50 million to achieve an ISCA rating, many I&S projects will be applying both the CERT and the ISCA IS rating tool in parallel. As such, efforts have been made to align the requirements of the CERT with those included in the IS rating tool where possible.

An Ene-1 output table has been included in the 'Detailed Results' tab of the CERT. Completion of this table supports the reporting requirements for design and

construction as outlined in ISCA's Ene-1 category: Energy and carbon monitoring and reduction.

Within the tool there are useful reminder prompts that provide further information regarding the CERT's interface with the Ene-1 requirements.

ISCA and I&S are working together to seek closer alignment between the materials emission factors included in both tools. In CERT, emission factors for materials are based on the Australian National Life Cycle Inventory Database (AusLCI), including its shadow-database. The only exceptions are factors for asphalt (based on TAGG 2013 Workbook) and recycled aggregates (based on a 2010 study for Sustainable Aggregates South Australia).

I&S is committed to reviewing the emission factors included in the CERT on a regular basis (at a minimum this will be done every 12 months) with a view to updating information as appropriate. I&S will look to engage with key stakeholders including ALCAS and ISCA to discuss update and revision timeframes.

Note: To achieve the ISCA credits associated with the Ene-1 criteria, additional work will be needed to estimate operational emissions. The CERT only provides emissions estimates for design and construction.

CERT structure

The CERT is structured to require input during three key stages of the project (initial/preliminary design – System Design Review (SDR); design completion – Critical Design Review (CDR); and six-monthly reporting during construction.

The tool is designed to capture relevant and material Scope 1, 2 and 3 GHG emissions as identified through the internal I&S emissions materiality assessment. The following provides a breakdown of the three relevant scope categories:

- Scope 1: All direct GHG emissions. E.g. emissions generated by the use of diesel fuel by construction plan/equipment; clearing of vegetation.
- Scope 2: Indirect GHG emissions from consumption of purchased electricity, heat or steam. E.g. Energy purchased to operate and run plant and equipment, power site offices, etc.
- Scope 3: Indirect upstream emissions. E.g. emissions from construction materials; disposal of waste; fuel used to transport materials and waste.

The information entered during each stage of the project informs the next. For example, once the SDR equivalent (representing approximately 20% design completion) has been completed, this information can then be used to inform the CDR stage which represents the 100% completed design. Following the design stages; reporting is to take place every six months during construction. The tool will automatically show the relevant number of reporting periods to cover the construction duration of your project.

Appendix E: Reporting Template

The following provides a reporting template of key project information generated using the CERT. This information should be completed for each stage of the project and submitted to I&S along with the completed CERT. It is designed to provide I&S with a quick reference of high-level project results. It may also be used internally to communicate progress.

Reporting Area	Response
Project Name	
Reporting stage covered by submission (<i>delete as appropriate</i>)	<ul style="list-style-type: none"> • SDR • CDR • Six-monthly construction reporting (specify submission reporting period)
Project GHG Reduction Target/s	
Key materials mitigation opportunities explored	
Key energy mitigation opportunities explored	
Key waste mitigation opportunities explores	
Total forecast/actual emissions for relevant reporting stage (tCO₂e)	

Reporting Area	Response
Total base case emissions for relevant reporting stage (tCO₂e)	
Total emissions reduction identified (tCO₂e)	